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NOTE ON THE SOLUTION OF PROB. 363, BY PROF. W. W. JOHNSON.—

The following proof of Prob. 363 shows that the theorem is true for all convex ovals.

Let  $O$  be the fixed point and  $AB$  the chord, the tangent at  $B$  being parallel to  $OA$ ; and complete the parallelogram  $AOBT$ . As  $B$  travels about the oval the tangent  $BT$  is at every instant rotating about  $B$ ; Hence, since  $BT$  is equal and parallel to  $OA$  it generates an area equal to that generated by  $OA$ , that is, an area equal to the given oval. Thus the area of the locus of  $T$  is double that of the oval. Now the middle point of  $AB$  is also the middle point of  $OT$ , hence its locus is similar to that of  $T$ , and its area is one fourth the area of the locus of  $T$  or one half the area of the given oval.

ANOTHER SOLUTION OF PROB. 365, BY PROF. ASAPH HALL.—It is plain that the indetermination will occur only for very small values of  $\theta$ .

Put therefore  $\cos \theta = 1 - \frac{1}{2}\theta^2$ , and, neglecting higher powers of  $\theta$ , we shall have,

$$\begin{aligned} \int_0^\theta \frac{\sqrt{(1-c)} \cdot d\theta}{1-c+\frac{1}{2}nc \cdot \theta^2} &= \sqrt{\frac{2}{nc}} \cdot \tan^{-1} \frac{\theta \cdot \sqrt{(nc)}}{\sqrt{[2(1-c)]}}; \\ &= \sqrt{\frac{2}{n}} \cdot \frac{\pi}{2} = \frac{\pi}{\sqrt{(2n)}}, \end{aligned}$$

when  $c = 1$ . This is the value required, since the upper limit may be changed from  $\theta$  to  $\frac{1}{2}\pi$ .

### SOLUTIONS OF PROBLEMS IN NUMBER SIX, VOL. VIII.

SOLUTIONS of problems in No. 6, Vol. VIII, have been rec'd as follows:

From R. J. Adcock, 374; Prof. W. P. Casey, 368, 370, 371; George E. Curtis, 370; Dr. H. Eggers, 368, 370; Prof. A. B. Evans, 371; Prof. E. J. Edmunds, 368, 369, 370; George Eastwood, 372; Prof. E. W. Hyde, 369; W. E. Heal, 369; William Hoover, 372; Prof. J. Scheffer, 368, 369, 370, 372; Prof. E. B. Seitz, 369, 370, 371; Thos. Spencer, 369; R. S. Woodward, 374.

368. *By Prof. J. Scheffer.*—"In a quadrilateral  $ABCD$ , the diagonal  $AC$  makes with the sides the four angles  $CAB = \alpha$ ,  $ACB = \beta$ ,  $ACD = \gamma$ ,  $CAD = \delta$ . Find the angles which the other diagonal  $BD$  makes with the sides."